

June 4, 1998

Ms. Rosemary Sullivan
Executive Secretary
Lowell Contributory Retirement System
City Hall, Room 3
375 Merrimack Street
Lowell, Massachusetts 01852-5998

Dear Rosemary:

Enclosed are ten copies of the January 1, 1998 actuarial valuation report of the Lowell Contributory Retirement System.

Please let me know if you have any questions regarding the report.

Sincerely yours,

Linda L. Bournival, ASA, EA
Consulting Actuary

Enc.

June 4, 1998

Retirement Board
City of Lowell Contributory Retirement System
City Hall, Room 14
375 Merrimack Street
Lowell, Massachusetts 01852-5998

Board Members:

We have completed an actuarial valuation of the Lowell Contributory Retirement System as of January 1, 1998. The results are presented in this report.

The Table of Contents, which immediately follows, indicates the material contained in the report.

Respectfully submitted,

Stephen G. Peterson, FSA, EA
Principal and Consulting Actuary

Linda L. Bournival, ASA, EA
Consulting Actuary

**REPORT ON THE JANUARY 1, 1998
ACTUARIAL VALUATION OF THE
LOWELL CONTRIBUTORY
RETIREMENT SYSTEM**

June 4, 1998

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SECTION I - OVERVIEW

The Lowell Retirement Board has engaged Buck Consultants to prepare an actuarial valuation of the Retirement System as of January 1, 1998. Employee data and asset information as of this date were provided by the Retirement Board.

The valuation was prepared pursuant to MGL Chapter 32, based upon the acceptance of Section 22D.

The purposes of the valuation are to:

- 1) analyze the current funded position of the System and determine the level of contributions necessary to assure sound funding;
- 2) quantify the financial impact of the Chapter 17 COLA legislation;
- 3) update the Section 22D funding schedule currently in place for the Retirement System;
and
- 4) provide reporting and disclosure information for financial statements, governmental agencies, and other interested parties.

Section II provides a summary of the principal valuation results. Section VI provides a projection of the Section 22D funding amounts.

SECTION II - SUMMARY OF PRINCIPAL RESULTS

1. For convenience of reference, the principal results of the valuation as of January 1, 1998 are summarized below along with a comparison with the amounts in the previous valuation as of January 1, 1997.

Valuation Date	January 1, 1998	January 1, 1997
Active members:		
Number	1,851	1,620
Annual compensation	\$ 56,559,466	\$ 47,028,355
Average age	44.0	44.4
Average service	8.8	9.8
Average compensation	\$ 30,556	\$ 29,030
Pensioners and beneficiaries:		
Number	1,031	1,025
Annual benefit payments ¹	\$ 14,645,967	\$ 14,430,958
Average benefit	\$ 14,206	\$ 14,079
Inactive employees		
Number	96	75
Accumulated employee contributions	\$ 661,060	\$ 533,810
Assets for valuation purposes	\$ 130,569,688	\$ 107,659,833
Unfunded actuarial liability	\$ 87,153,550	\$ 88,338,766
Section 22D funding for fiscal 1999	\$ 12,334,537	\$ 12,645,757
Funded percentage	60.0%	54.9%

¹ Benefit amount excludes cost-of-living adjustments paid after July 1, 1981.

2. A projection of Section 22D costs is presented in Section VI.

3. Schedule B of this report outlines the full set of actuarial assumptions and methods employed.
4. The provisions of the System are summarized in Schedule C. The valuation includes additional liabilities resulting from Chapter 17 COLA legislation.

SECTION III - MEMBERSHIP DATA

1. In order to calculate the aggregate liabilities and assets on account of members of the System as of January 1, 1998, data were needed with respect to each active and retired member and beneficiary of the System. The data with respect to active, retired and terminated members and beneficiaries were furnished to the actuary on diskette by the Retirement Board.
2. From the data, tabulations were made showing as of January 1, 1998 the number and annual compensation of members classified by age and years of service and the number and annual retirement allowances of retired members and beneficiaries as of January 1, 1998 classified by age. These tables are presented in Schedule D.

3. The following tables show the number of active and retired members of the Retirement System as of January 1, 1998.

TABLE I
THE NUMBER AND ANNUAL COMPENSATION
OF ACTIVE MEMBERS
AS OF JANUARY 1, 1998

GROUP	NUMBER	COMPENSATION*
General Employees		
Men	569	\$ 16,403,304
Women	<u>839</u>	<u>15,431,799</u>
Total	1,408	\$ 31,835,103
Police and Fire		
Men	426	\$ 20,608,084
Women	<u>17</u>	<u>785,293</u>
Total	443	\$ 21,393,377
Total	1,851	\$ 53,228,480

* Not annualized

TABLE II
THE NUMBER AND ANNUAL RETIREMENT ALLOWANCES OF
RETIRED MEMBERS AND BENEFICIARIES
AS OF JANUARY 1, 1998

GROUP	<u>ANNUAL RETIREMENT ALLOWANCE</u>			TOTAL
	NUMBER	PENSION*	ANNUITY	
<u>Service Retirements</u>				
Men	378	\$ 6,232,067	\$ 945,016	\$ 7,177,083
Women	267	1,523,493	300,695	1,824,188
Total	645	\$ 7,755,560	\$ 1,245,711	\$ 9,001,271
<u>Disability Retirements</u>				
Men	184	\$ 3,547,433	\$ 262,906	\$ 3,810,339
Women	13	82,611	6,822	89,433
Total	197	\$ 3,630,044	\$ 269,728	\$ 3,899,772
<u>Dependent Beneficiaries of Deceased Members and Beneficiaries</u>				
Men	111	\$ 1,175,610	\$ 54,063	1,229,673
Women	78	485,438	29,813	515,251
Total	189	\$ 1,661,048	\$ 83,876	\$ 1,744,924
Grand Total	1,031	\$ 13,046,652	\$ 1,599,315	\$ 14,645,967

* Pension amount excludes cost-of-living adjustments paid after July 1, 1981.

In addition, there are 96 members with estimated deferred benefits of \$661,060.

SECTION IV - ASSETS

1. The amount of assets taken into account in this valuation is based on financial information reported by the Retirement Board.
2. As of January 1, 1998 preliminary market value of Retirement System assets amounted to \$130,569,688.
3. The actuarial value of assets for valuation funding purposes is reported market value of \$130,569,688.

SECTION V - COMMENTS ON VALUATION

Schedule A of this report contains the results of the valuation which show present and prospective assets and liabilities of the System as of January 1, 1998.

The schedule shows that the System has actuarial liabilities of \$294,340,671, of which \$117,010,593 is for benefits payable on account of present retired members and beneficiaries, \$176,669,018 is for benefits payable on account of present active members, and \$661,060 is for benefits payable on account of present inactive members. Against these liabilities, there are anticipated future contributions by members of \$46,596,448 and future normal contributions of \$30,020,985 payable by the City. Subtracting these amounts from the total actuarial liabilities leaves \$217,723,238 as the accrued actuarial liability. Against this amount there are present assets of \$130,569,688 which when subtracted from the accrued liability leaves \$87,153,550 as the unfunded accrued liability.

The normal contribution rate is 5.40% of annualized compensation.

SECTION VI - CONTRIBUTIONS PAYABLE UNDER THE SYSTEM

Section 22D of MGL Chapter 32 outlines various requirements of a funding schedule that will amortize the unfunded actuarial liability and cover normal costs. The normal cost and unfunded actuarial liability are to be calculated in accordance with the entry age normal actuarial cost method. Amortization of the unfunded actuarial liability is to be based on a schedule that ends no later than the year 2028. The contribution toward amortization of the unfunded actuarial liability may increase by up to 4½% each year.

The following table presents a projection of contributions which meet the Section 22D requirements. The contributions were computed assuming that one-half of the contribution is paid on July 1, and the remainder is paid on January 1. The normal cost is assumed to increase by 5% annually while the unfunded accrued liability contribution is constant. This schedule incorporates the funding required to provide annual COLAs under Chapter 17 of the Acts of 1997.

PENSION REFORM ACT - SECTION 22D
FUNDING REQUIREMENTS

Fiscal Year Ending in	Total Normal	Amortization of the Unfunded Actuarial Liability			Expenses	Total City Contribution
		Active	Retired	ERI		
1999	\$3,867,788	\$3,382,439	\$4,353,010	\$347,512	\$350,000	\$12,300,749
2000	4,061,177	3,382,439	4,353,010	347,512	367,500	12,511,638
2001	4,264,236	3,382,439	4,353,010	347,512	385,875	12,733,072
2002	4,477,448	3,382,439	4,353,010	347,512	405,169	12,965,578
2003	4,701,320	3,382,439	4,353,010	347,512	425,427	13,209,708
2004	4,936,386	3,382,439	4,353,010	347,512	446,698	13,466,045
2005	5,183,205	3,382,439	4,353,010	347,512	469,033	13,735,199
2006	5,442,365	3,382,439	4,353,010	347,512	492,485	14,017,811
2007	5,714,483	3,382,439	4,353,010	347,512	517,109	14,314,553
2008	6,000,207	3,382,439	4,353,010	347,512	542,964	14,626,132
2009	6,300,217	3,382,439	4,353,010	0	570,112	14,605,778
2010	6,615,228	3,382,439	4,353,010	0	598,618	14,949,295
2011	6,945,989	3,382,439	4,353,010	0	628,549	15,309,987
2012	7,293,288	3,382,439	4,353,010	0	659,976	15,688,713
2013	7,657,952	3,382,439	4,353,010	0	692,975	16,086,376
2014	8,040,850	3,382,439	4,353,010	0	727,624	16,503,923
2015	8,442,893	3,382,439	4,353,010	0	764,005	16,942,347
2016	8,865,038	3,382,439	4,353,010	0	802,205	17,402,692
2017	9,308,290	3,382,439	4,353,010	0	842,315	17,886,054
2018	9,773,705	3,382,439	4,353,010	0	884,431	18,393,585
2019	10,262,390	3,382,439	4,353,010	0	928,653	18,926,492
2020	10,775,510	3,382,439	4,353,010	0	975,086	19,486,045
2021	11,314,286	3,382,439	4,353,010	0	1,023,840	20,073,575
2022	11,880,000	3,382,439	4,353,010	0	1,075,032	20,690,481
2023	12,474,000	3,382,439	4,353,010	0	1,128,784	21,338,233
2024	13,097,700	3,382,439	4,353,010	0	1,185,223	22,018,372
2025	13,752,585	3,382,439	4,353,010	0	1,244,484	22,732,518
2026	14,440,214	3,382,439	4,353,010	0	1,306,708	23,482,371
2027	15,162,225	3,382,439	4,353,010	0	1,372,043	24,269,717
2028	15,920,336	3,382,439	4,353,010	0	1,440,645	25,096,430
2029	16,716,353	0	0	0	1,512,677	18,229,030
2030	17,552,171	0	0	0	1,588,311	19,140,482

SCHEDULE A - RESULTS OF THE VALUATION

As of January 1, 1998 (Reflecting Chapter 17 COLA Legislation)

1.	Present value of prospective benefits payable in respect of:	
	Present retired members and beneficiaries	\$ 117,010,593
	Present active members	176,669,018
	Present inactive members	<u>661,060</u>
	Total actuarial liabilities	\$ 294,340,671
2.	Present value of future contributions by members	\$ 46,596,448
3.	Present value of future normal contributions by the City	\$ 30,020,985
4.	Accrued liability, 1. - 2. - 3.	\$ 217,723,238
5.	Assets	\$ 130,569,688
6.	Unfunded accrued liability, 4. - 6.	\$ 87,153,550
7.	Funded ratio, 5. \div 4.	60.0%
8.	Present value of future normal contributions by the City, 3.	\$ 30,020,985
9.	Present value of future salaries	\$ 556,429,600
10.	Normal contribution rate, 8. \div 9.	5.40%
11.	Annualized compensation	\$ 56,559,466
12.	Normal cost, January 1, 1998, 10. x 11.	\$ 3,054,211
13.	Normal cost payable by City, fiscal year 1999	\$ 3,867,788
14.	Normal cost payable by employees, fiscal year 1999	\$ 4,222,561

SCHEDULE B - ACTUARIAL ASSUMPTIONS AND METHODS

GENERAL EMPLOYEES

VALUATION INTEREST RATE: 8½% per annum, compounded annually, net of administrative expenses.

SEPARATIONS FROM ACTIVE SERVICE: Representative values of the assumed annual rates of withdrawal and vesting, disability, death and service retirement are as follows:

Annual Rates of

Age	Withdrawal and Vesting	Disability*	Death		Service Retirement
			Male	Female	
25	9.5%	.12%	.05%	.03%	
30	8.9	.13	.06	.03	
35	7.0	.15	.09	.05	
40	4.5	.17	.12	.07	
45	3.1	.21	.22	.10	
50	2.6	.32	.39	.17	
55	1.7	.50	.61	.25	10.0%
60		.81	.92	.42	5.0
62		.81	1.11	.52	10.0
65		.81	1.56	.71	25.0
69			2.48	1.09	25.0

* It is assumed that 50% of all disability retirements and deaths are due to accidents in the performance of duty.

SALARY INCREASES: Salaries were assumed to increase annually by 5½% for each active member.

COST-OF-LIVING ADJUSTMENTS: Retirement benefits were assumed to increase annually by 3%, up to a maximum of \$360.

DEATHS AFTER RETIREMENT: The 1983 Group Annuity Mortality (GAM) Table. For the period after disability retirement, special mortality tables are used.

SPOUSES: 85% of male employees and 45% of female employees are assumed to be married with wives four years younger than husbands.

LOADING OR CONTINGENCY RESERVE: None.

ACTUARIAL COST METHOD: Aggregate entry age normal cost method.

POLICE AND FIRE

VALUATION INTEREST RATE: 8½% per annum, compounded annually, net of administrative expenses.

SEPARATIONS FROM ACTIVE SERVICE: Representative values of the assumed annual rates of disability, death and service retirement are as follows:

Annual Rates of

Age	Withdrawal and Vesting	Disability*	Death		Service Retirement
			Male	Female	
25	2.9%	.23%	.05%	.03%	
30	2.3	.34	.06	.03	
35	1.6	.48	.09	.05	
40	1.0	.62	.12	.07	
45	.5	.76	.22	.10	
50		.90	.39	.17	10.0%
55		1.04	.61	.25	10.0
60			.92	.42	36.0
62			1.11	.52	16.0
65			1.56	.71	100.0

* It is assumed that 90% of all disability retirements and deaths are due to accidents in the performance of duty.

SALARY INCREASES: Salaries were assumed to increase annually by 5½% for each active member.

COST-OF-LIVING ADJUSTMENTS: Retirement benefits were assumed to increase annually by 3%, up to a maximum of \$360.

DEATHS AFTER RETIREMENT: The 1983 Group Annuity Mortality (GAM) Table. For the period after disability retirement, special mortality tables are used.

SPOUSES: 85% of male employees and 45% of female employees are assumed to be married with wives four years younger than husbands.

LOADING OR CONTINGENCY RESERVE: None.

ACTUARIAL COST METHOD: Aggregate entry age normal cost method.

SCHEDULE C - SUMMARY OF SYSTEM PROVISIONS

MEMBERSHIP

The Retirement System covers all employees of the City of Lowell except teachers and elected officials and those employees in service at the time of its establishment who elected not to become members. Eligible employees in the City who enter service on or after the date the System became operative for their classification may become members of the Retirement System on their own application.

SUMMARY OF BENEFIT AND CONTRIBUTION PROVISIONS

A summary of the main benefit and contribution provisions of the Retirement System, as interpreted for the valuation, is presented below.

The terms “Group 1” and “Group 4” are used to denote “general employees” and “police and fire”, respectively.

BENEFITS

Final Average Salary (FAS)	The average of a member’s 3 highest consecutive years’ compensation.
Superannuation Retirement	
Eligibility	Age 65 for Group 1; Age 55 for Group 4. Maximum retirement age is 70 for Group 1 and 65 for Group 4.
Allowance	2.5% per year of service times FAS. Veterans receive additional \$15 annually per year of service to a maximum of \$300 annually. Maximum total allowance is 80% of FAS.
Early Retirement	

Eligibility	20 years of service.
Allowance	<p>Calculated as a superannuation retirement allowance (including veteran's benefits) except accrual rate is equal to 2.5% reduced by .1% for each year age at retirement is below either 65 for Group 1 or 55 for Group 4.</p> <p>The minimum allowance after 30 years of service is equal to:</p> <ol style="list-style-type: none">(1) An annuity which is the actuarial equivalent of member's accumulated deductions; and(2) A pension equal to 1/3 of FAS and any veteran's benefits as described under superannuation retirement.
Vested Retirement	
Eligibility	10 years of service. For certain involuntary terminations, this is reduced to 6 years.
Allowance	A superannuation retirement allowance commencing at age 55 for Group 1 members and age 45 for Group 4 members or later, where the accrual rate is determined by the age of the member at the time the allowance commences.
Ordinary Disability	
Eligibility	For nonveterans, 10 years of service prior to age 55 for Group 1 members or age 45 for Group 4 members. For veterans, 10 years of service prior to maximum retirement age.
Allowance	<p>An immediate allowance equal to the age 55 rate for Group 1 members or age 45 rate for Group 4 members per year of service times FAS.</p> <p>Veterans receive an allowance equal to:</p> <ol style="list-style-type: none">(1) An annuity which is the actuarial equivalent of their accumulated deductions; and(2) A pension which is the greater of 50% of current salary and the service retirement allowance to which they are eligible, if any.
Accidental Disability	

Eligibility None.

Allowance An immediate allowance equal to:

- (1) An annuity which is the actuarial equivalent of the member's accumulated deductions; and
- (2) A pension equal to 72% of current salary; and
- (3) A supplement equal to \$450 per year per child under 21.

The maximum total allowance is 100% of current salary.

Accidental Death Benefit

Eligibility None.

Allowance An immediate allowance equal to:

- (1) A lump sum payment equal to the accumulated deductions at death; and
- (2) A pension equal to 72% of current salary and payable to the surviving spouse, dependent children, or the dependent parents; and
- (3) A supplement of \$312 per year per child payable to the spouse or legal guardian until all children reach age 21, unless handicapped.

The maximum total allowance is 100% of current salary.

Death in Active Service

Eligibility None.

Allowance An immediate allowance that would have been payable had the member retired and elected the 2/3 joint and survivor option on the day before his death. For death occurring prior to the minimum superannuation retirement age, the age 55 and age 45 accrual rates are used, respectively, for Group 1 and Group 4 members.

For members with at least 2 years of service at death, the surviving spouse receives an additional allowance equal to the sum of \$960 per year for the first child and \$720 per year for each additional child.

The minimum allowance is \$140 per month. The maximum total allowance is 100% of salary at the date of death.

Normal Form of Benefit	Reduced modified cash refund annuity.
Optional Forms of Benefit	<ul style="list-style-type: none"> (1) Life annuity. (2) Modified cash refund annuity. (3) 66-2/3% joint and survivor allowance.
Return of Contribution	If no other benefit is payable upon termination, the member's accumulated deductions are returned.
Post-Retirement Adjustments	Up to 3% of the annual retirement allowance up to a maximum of \$360 annually.
Member Contributions	Members contribute a percentage of annual regular compensation in accordance with their respective dates of hire, as shown below:

<u>Date of Hire</u>	<u>Rate of Contribution</u>
Prior to January 1, 1975	5%
On or after January 1, 1975	7%
On or after January 1, 1984	8%
On or after July 1, 1996	9%

Members hired on or after January 1, 1979 contribute an additional 2% of compensation in excess of \$30,000.

SCHEDULE D

MEMBERSHIP TABLES

SCHEDULE E
VALUATION RESULTS BY GROUP